**Predicting TDS Release from Overburden**

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**Abstract**

The overall objective of the projects reported here is to develop better methods to predict TDS release from Appalachian coal overburden materials. Our overall program integrates work sponsored by the Appalachian Regional Initiative for Environmental Science (ARIES), the Powell River Project and the Office of Surface Mining. Current work includes (A) detailed lab and field analyses of spoils, (B) column leaching trials, (C) field studies of soil/spoil properties with depth and (D) scaling studies. Detailed lab and field analyses on a range of spoil materials are being conducted by cooperators at the University of Kentucky (Agouridis, Barton and Warner) and West Virginia University (McDonald and Skousen). We are using a simple column leaching approach to study TDS elution relationships from a variety of spoil materials. Over fifty regional (KY, TN, VA, and WV) spoils typical of those used as topsoil substitutes or placed into valley fills have been characterized and subjected to leaching with simulated rainfall under unsaturated conditions. The pH of the bulk samples (prior to leaching) was typically near-neutral to alkaline. Initial electrical conductance (EC) values ranged from 500-1000 µs/cm to > 3000 µs/cm, but 2/3 of the samples tested dropped below 500 µs/cm after several pore volumes of leaching and approximately ½ dropped below 300 µs/cm. Both initial (maximum) and long-term equilibrium leachate EC levels were strongly affected by rock type and degree of oxidation and pre-weathering of the spoils. In general, lowest EC levels were associated with significantly weathered/oxidized materials and highest EC levels were produced by black shales. In related field studies, we have sampled over 12 soil/saprolite/rock sequences to evaluate changes in soil/spoil pH, EC and color with depth to develop field criteria for isolation of low TDS producing materials. Spoil color (e.g. brown/yellow vs. gray) and relative hardness of the rock unit can be used to reliably separate low EC producing strata from higher EC materials at depth. All oxidized/brown materials above 4 m (~15 feet) tested to date generated very low saturated paste extract EC. While the column technique discussed above may provide a viable option for TDS prediction, it is resource- and time-intensive and more than likely over-predicts TDS production relative to actual field scale occurrence. Current work at Virginia Tech and the University of Kentucky is focused on relating lab column results to larger volume leaching tank (mesocosm) and field-scale leaching data to develop appropriate scaling factors.